A Data Abstraction Architecture for Spacecraft Autonomy, Phase II

Completed Technology Project (2008 - 2010)

Project Introduction

The new Constellation vehicles, habitats and robots will be highly sensored and generate large amounts of data. For this data to be useful to humans monitoring these systems and to automated algorithms controlling these systems it will need to be converted into more abstract data. This abstracted data will reflect the trends and characteristics of the systems and their environments. Currently this data abstraction process is manual and ad hoc. It is manual in the sense that either humans do the abstraction in their heads or the data abstraction is done by hand-coding computer programs for each data item. It is ad hoc in the sense that each data abstraction is developed on its own with no representation of how it relates to the tasks being performed or to other data abstractions. In this project we propose building a Data Abstraction Architecture (DAA) that allows engineers to design software processes that iteratively convert spacecraft data into higher and higher levels of abstraction. The DAA also formalizes the relationships between data and control and the relationships between the data themselves. The DAA consists of representations for data and data abstractions, a data store, a abstraction architecture processing engine and a development environment. We will evaluate the architecture using three NASA domains: 1) a lunar outpost monitoring and control application; 2) a robotic scientific survey application; and 3) a vehicle procedure execution scenario.

Primary U.S. Work Locations and Key Partners
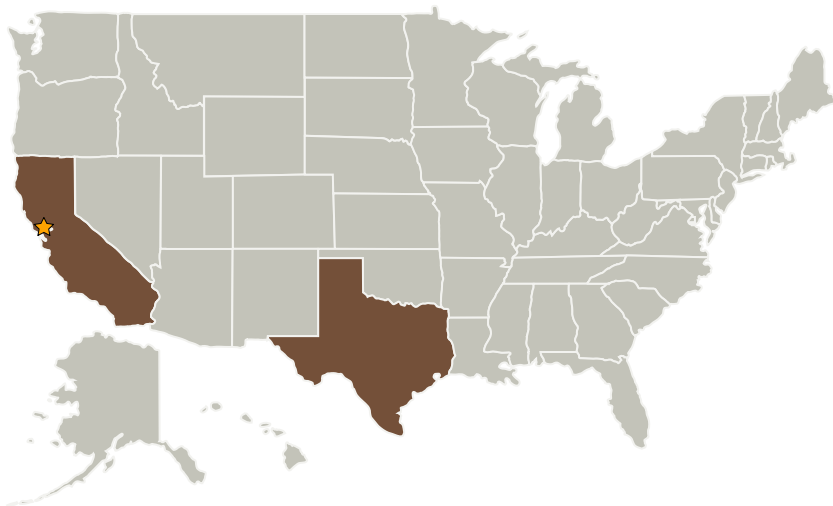
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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Organizations Performing Work	Role	Type	Location
⭐Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
TRACLabs, Inc.	Supporting Organization	Industry	Webster, Texas

Primary U.S. Work Locations	
California	Texas

Project Transitions

▶ **February 2008:** Project Start

✔ **February 2010:** Closed out

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  └ TX02.2 Avionics Systems and Subsystems
    └ TX02.2.6 Data Acquisition Systems

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